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Chief, Design Section

11 September 1958

25X1

Cursory Check of the TA-1A Adaptor and Modulator Units

1. The TA-1A Adaptor and Modulator units were subjected to a cursory evaluation by the A&A Section, R&D Laboratory. A summary of the electrical characteristics of the TA-1A Adaptor and the details of the test results are presented in the following paragraphs.

2. Summary

2.1. Frequency Range

Low Band : 3.330 - 8.015 mc
High Band: 7.500 - 14.00 mc

2.2. TA-1A RF Power Output (Average)

Low Band: Fundamental Operation - 2.59 watts
Doubling - 1.31 watts

High Band: Fundamental Operation - 1.55 watts
Doubling - 0.75 watts

2.3. TA-1A RF Crystal Current

Low Band	Resonant	Off-Resonant
Maximum	40 ma	107 ma
Minimum	8 ma	5 ma
Average	32.86 ma	70.25 ma
High Band		
Maximum	45 ma	92 ma
Minimum	30 ma	30 ma
Average	38.29 ma	56.70 ma

2.4. TA-1A DC Input Power (Average)

Resonance	7.75 watts
Off-Resonance	15.50 watts

2.5. TA-1A Modulator Unit

The modulator modulates the TA-1A adaptor approximately 50%.

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3. Details of Test Results

3.1. TA-1A RF Power Output (Ant. Load 307 Ohms)

Freq. (MC)	RF Current (MA)	RF Power (Watts)	Freq. Band
	DC Input - 250 Volts		
3.002	55	0.93	Low
3.330	95	2.76	
4.081	90	2.49	
5.002	92	2.60	
6.002	90	2.49	
7.000	92	2.60	
7.500	92	2.60	
8.015	92	2.60	
8.299	77	1.82	
	Doubling DC Input - 250 Volts		
2 x 2.001	68	1.42	Low
2 x 2.519	75	1.73	
2 x 3.330	50	0.77	
	DC Input - 200 Volts		
3.330	70	1.50	Low
4.081	67	1.38	
5.002	70	1.50	
6.002	69	1.46	
7.000	68	1.42	
7.500	70	1.50	
8.015	67	1.38	
8.299	53	0.86	
	DC Input - 250 Volts		
7.201	52	0.83	High
7.500	69	1.46	
8.015	72	1.59	
8.500	72	1.59	
2 x 5.002	51	0.80	
2 x 6.002	55	0.93	
2 x 7.000	52	0.83	
2 x 8.015	45	0.62	
2 x 8.500	44	0.59	

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DC Input - 200 Volts

Freq. (MC)	RF Current (MA)	RF Power (Watts)	Freq. Band
7.201	38	0.49	
7.500	52	0.83	
8.015	54	0.89	
8.500	54	0.89	High
2 x 5.002	38	0.44	
2 x 6.002	40	0.49	
2 x 7.000	40	0.49	
2 x 8.015	32	0.31	
2 x 8.500	34	0.35	

TA-1A RF Power Output With Various Antenna Loads

DC Input - 250 Volts

Freq. (MC)	RF Power Output		Antenna Resistor (Ohms)	Freq. Band
	RF Current (MA)	RF Power (Watts)		
3.330	177	2.47	79	
5.002	175	2.42	79	
7.500	177	2.47	79	
3.330	64	2.74	668	
5.002	65	2.82	668	Low
7.500	65	2.82	668	
3.330	48	2.93	1270	
5.002	50	3.17	1270	
7.500	53	3.56	1270	
7.500	138	1.55	79	
8.500	144	1.64	79	
2 x 6.002	110	0.95	79	
2 x 8.015	85	0.57	79	High
7.500	48	1.54	668	
8.500	52	1.80	668	
2 x 6.002	39	1.02	668	
2 x 8.015	32	0.68	668	
7.500	36	1.64	1270	
8.500	38	1.83	1270	
2 x 6.002	29	1.07	1270	
2 x 8.015	24	0.73	1270	

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3.2. TA-1A RF Crystal Current

Freq. (MC)	Tune Position		Load Position		Freq. Band
	Res.*	Off-Res.	Res.	Off-Res.	
DC Input - 250 Volts					
3.002	28	28	30	30	Low
3.330	20	22	8	36	
4.081	15	120	40	78	
5.002	10	100	30	65	
6.002	20	130	40	94	
7.000	10	180	40	107	
7.500	10	178	32	105	
8.015	20	26	40	20	
8.299	5	5	26	5	
Doubling DC Input - 250 Volts					
2 x 2.001	10	10	10	10	Low
2 x 2.519	22	20	22	22	
2 x 3.330	5	5	10	10	
DC Input - 250 Volts					
7.201	40	105	42	92	High
7.500	32	110	35	88	
8.015	28	100	38	73	
8.500	34	105	40	86	
2 x 5.002	30	30	30	30	
2 x 6.002	42	44	44	44	
2 x 7.000	43	42	45	42	
2 x 8.015	36	38	36	34	
2 x 8.500	44	42	44	42	

* At resonance, tune position, the crystal current as indicated by the indicator lamp brilliance may exceed 100 ma because of broad tuning.

3.3. TA-1A DC Input Power

Low Band (3.330 mc) : Resonance - 28 ma/250 volts, 7 watts
Off-Resonance - 62 ma/250 volts, 15.5 watts

High Band (7.500 mc) : Resonance - 34 ma/250 volts, 7.75 watts
Off-Resonance - 62 ma/250 volts, 15.5 watts

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3.4. TA-1A Modulator Unit

The modulator unit modulates the TA-1A adaptor approximately 50%. From previous tests, the modulator amplifier provides a voltage gain of 5000. The modulator frequency response is limited to the voice range (250-3000 cycles) by the miniature microphone.

3.5. TA-1A Operational Characteristics

(a) The transmitter is fairly easy to tune to frequency when using fundamental crystals. The "tune position" indicator lamp does not light when doubling on the high band at 16 mc.

(b) In the "tune position" the crystal current, at resonance, exceeds 100 ma. However, in the load position, the crystal current drops to 45 ma (maximum) at resonance.

(c) The markings on the TA-1A are not adequate. The decals are peeling off the chassis.

(d) Frequency markings on the tuning dial were not provided on the unit tested.

(e) The high band coil has ten taps rather than eight. The last two positions of the coil serve no purpose since the impedance range of 79 ohms to 1270 ohms required only the first 7 taps on both high band and low band coils.

(f) It is essential to observe caution while tuning the transmitter unit to avoid burning out the #331 antenna indicator lamp.

3.6. TA-1A Operational Test

The TA-1A Adaptor and Modulator were connected to an RCA table model receiver (type 3RF-91) and tuned for normal operation. The units performed as follows:

(a) The BFO does not operate. (Note: Trouble has been corrected)

(b) The CW power output obtained with a 307 ohm antenna resistor measured 1.34 watts at 3.330 mc (low band) and 1.18 watts at 7.5 mc (high band). The DC plate voltage measured 255 volts and dropped to 225 volts, key down.

(c) The modulator appeared to operate normally as observed on a 51-J receiver.

(d) Some hum was observed on the receiver while using the TA-1A adaptor. The hum disappeared when the adaptor plug was replaced with the 6V6 tube in the receiver.

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(e) The antenna bulb did not light when the adaptor unit was loaded with a long wire antenna (approximately 100 feet). The test frequency was 7.5 mc, high band.

4. Conclusions and Recommendations

The TA-1A adaptor is not acceptable as a prototype unit for reasons listed as follows:

(a) The BFO does not operate.

(b) The unit does not cover the specified frequency range.

(c) The crystal current is excessive in the tune position.

(d) The unit has not been supplied with a calibrated (frequency) tuning dial.

(e) The high band coil should be an eight tap coil rather than a ten tap coil.

(f) The tuning lamp did not operate with a long wire antenna.

(g) The hand key must be held down to use the modulator. This is acceptable but it is an inconvenience when trying to operate the modulator. It is recommended that consideration be given to using a double pole switch (phone-CW) and simultaneously apply operating voltages to the transmitter tube and, also, return the cathode to ground through the phone-CW switch when the switch is thrown to the phone position.

The modulator unit is an acceptable unit and appeared to operate satisfactorily during the electrical tests.

Note: The output power of the TA-1A seems rather low on frequencies above 8 mc. I wonder if a close look at the feasibility of operating an audio tube at RF frequencies to 22 mc should be made. Power output may dwindle to a few hundred milliwatts at the upper end of the range. (Note by [redacted] 25X1

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